
Metacognition Awareness and Its Correlation with Academic Achievement of Student Teachers: The Case of One Private Higher Education Institution

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Abstract

This study aimed to describe the metacognitive awareness of Indonesian language and literature educational students in one private higher education institution, Jambi, Indonesia and to differentiate student metacognition by gender and length of study, and to correlate metacognition awareness on student achievement indexes. This was a quantitative study and the sample was taken by involving the third, fifth, and seventh semester student teachers. Documents in the forms of student achievement index data and questionnaires were used as the instruments of this study and manual calculations and SPSS 16.0 for Windows were used to analyze the collected data. The results showed that there was no significant difference between metacognitive awareness of male and female student teachers, and between metacognitive awareness of the second year, the third year, and the fourth year. Also, there was a very weak positive relationship between metacognitive awareness and students' achievement. Implications and future research are also discussed.

Keywords

Educational students, gender, length of study, metacognition awareness, students' achievement

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Introduction

Metacognition is a somewhat new knowledge introduced in Indonesian education listed in the 2013 Curriculum. The ability of thinking has actually been discussed since the days of Plato and Aristotle (Akturk & Sahin, 2011; Othman, Mustapha, Tray, & Ahmad, 2008). However, the concept of metacognition was introduced by Flavell in 1976 by examining the ways and processes of learning (Akturk & Sahin, 2011; Othman, Mustapha, Tray, & Ahmad, 2008). Anderson and Krathwohl (2001) added knowledge of metacognition to the dimension of knowledge in Bloom's (1956) taxonomy that the knowledge dimension becomes four categories; factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge. Besides, knowledge of metacognition is included in the educational curriculum in Indonesia.

Furthermore, metacognition ability is found as one of the core competencies that must be mastered by students of XI and XII classes. This competency ties various basic competencies into aspects of attitudes, skills, and knowledge that students must learn for a school, class, and subject level (Kemendikbud, 2013). This means that all subjects in classes of XI and XII involve learning metacognition skills so that students can form metacognitive awareness. Metacognition awareness should have been formed since secondary school that will settle and develop when they become a student. The formation and development of metacognitive awareness will be more expected in student teachers because they are prepared to become teachers who later will have tasks to develop students' cognitive abilities.

In addition, metacognition can be a driving force as well as a supervisor in using cognition or knowledge that a person has when completing a particular task or while studying so that one's success, in any field, is more determined by his metacognition abilities. Moreover, metacognition is a key element in learning (Fisher, 1998) which will affect the success of learning (Asriningsih, Saepuzaman, & Ferranie, 2016) and will later affect the success of one's life. This is possible because metacognition includes knowledge of cognition and regulation of cognition (Schraw & Dennison, 1994). Furthermore, metacognition awareness directs someone to recognize what he knows and what he does not know is related to the task to be completed. This knowledge includes declarative knowledge, procedural knowledge, and conditional knowledge. Based on those, arrangements are made for the implementation of tasks included planning, information management strategies, monitoring understanding, debugging strategies, and evaluation (Schraw & Dennison, 1994). Therefore, it is no exaggeration if it is stated that metacognition will help an individual to learn or complete tasks more effectively.

Effective learning or completion of tasks refers to the learning process or the completion of a successful task, which is marked by achieving the right goals. Achieving goals, not only can be achieved precisely but can also be achieved more quickly because the goals that have been formulated and realized before the learning process/ completion of the task is made. Research done by Baird (1998), Hacker (1998), and White and Gunstone (1989, cited in Conner, 2007) showed that learning can be improved if students use a metacognitive

process, while the Conner (2007) study showed that the use of metacognitive strategies for planning and monitoring work produced higher quality essays. However, this study has not documented the level of metacognition awareness of students and their relationship to their learning achievement. Hence, this study was intended to reveal the level of metacognitive awareness of students of the Indonesian language and literature education program in one private higher education institution. This study also looked at the differences in metacognition awareness based on gender and length of study and its relation to student academic success as determination of metacognition in the context of educational students is still rare. To achieve the research objectives, three research questions were formulated; 1) Is there any significant difference between metacognition awareness of male students and female student teachers? 2) Is there any significant relationship between the second, third, and fourth year student metacognition awareness? 3) Is there any significant relationship between student metacognition awareness and student achievement index?

Literature Review

Metacognition awareness

Metacognition awareness is called by several researchers with different terms, while it refers to the same object. Flavell (1976 as cited in Akturk & Sahin, 2011; Cubukcu, 2009) defines metacognition as one's knowledge concerning one's own cognitive processes and products or anything related to them. Besides, Akturk and Sahin (2011) noted several terms used by researchers referring to objects called Metacognition by Flavell (1976) including: self-management, metamentation, meta-learning, metacognitive beliefs, executive skills, meta-components and judgment of learning. The term of metacognition awareness is also used by Schraw and Denisson (1994), Schraw (1998), and Vandergrift, Goh, Mareschal and Tafaghodtari (2006). Schraw and Denisson (1994) state that metacognition refers to a person's ability to reflect, understand, and control learning.

Various studies on metacognition provide varying meanings, whereas not too much different. Akturk and Sahin (2011), after reviewing various literatures related to metacognition, formulated the most commonly used definition of metacognition, that is, information that one possesses about its cognition and ability to regulate the structure of that cognition. This definition distinguishes metacognition into two main components; knowledge of cognition and regulation of cognition (Anderson & Krathwohl, 2001; Schraw & Denisson, 1994; Schraw, 1998). Furthermore, Schraw and Dennison (1994) divide the knowledge component of cognition into three subcomponents; (1) declarative knowledge (knowledge of self and strategy), (2) procedural knowledge (i.e., knowledge on how to use strategies), and (3) conditional knowledge (i.e. knowledge on when and why to use strategies) in which divided into five subcomponents, including (4) planning, (5) information management strategies, (6) understanding monitoring, (7) debugging strategies, and (8) evaluation.

Metacognition awareness and learning achievement

Metacognition activities cannot stand alone in the learning process and in the completion of one's tasks. It is closely related to cognition. Akturk and Sahin (2011) describe that metacognition activities occur before cognitive activities (planning metacognition), during cognitive activities (monitoring metacognition) and after cognitive activities (evaluation metacognition). Thus, metacognition is higher knowledge of cognition, which serves to recognize cognitions owned or not possessed and manage cognition in order to solve problems or learning processes. If cognition is to realize and understand something, then metacognition is to realize and know how someone learns and understands something. In short, metacognition can be said as a person's knowledge of his cognition process and product cognition and the ability to manage and manage it. Although metacognition and cognition cannot be separated, they are functionally different. Schraw (1998) and Holton and Clarke (2006) assert that metacognition is different from cognition. Metacognition is needed to understand how a task will be performed, while cognition itself is needed to complete the task (Schraw, 1998). It means that metacognition works first then followed by cognition. Schraw (1998) furthermore emphasized that metacognition is a basic requirement for the effectiveness of cognition. The ability of cognition functions effectively if metacognition is in a high level. Conversely, cognitive abilities will not function effectively if metacognition is in a low level. Thus, it means that the ability of metacognition determines one's success more than its cognition.

In learning, metacognition is related to the ability to plan learning, monitor progress or setback experience during the learning process and finally evaluate the results of the learning process. Thus, it will help students to carry out more appropriate learning activities in order to achieve learning goals because awareness of metacognition includes knowledge of cognition and regulation of cognition (Schraw & Dennison, 1994). By the knowledge of cognition and cognitive settings, student learning activities can be more effective. In addition, effective learning refers to a successful learning process, which is characterized by the achievement of learning objectives appropriately. The objectives are formulated and realized before the learning processes are used as the basis in carrying out learning and in evaluating. Effective learning certainly impacts on student academic achievement as Schraw said (1998) that metacognition is important for successful learning because it allows individuals to better manage their cognitive skills, and to determine weaknesses that can be improved by building new cognitive skills. Additionally, Dunning, Johnson, Ehrlinger and Kruger (as cited in Al Baddareen, Ghaith, & Akour, 2015) state that metacognition is a strong predictor of academic success for students. Several studies have shown that metacognition can improve learning. In Conner's study (2007), he listed several studies (Baird, 1998; Hacker, 1998; and White & Gunstone, 1989), which showed that learning can be improved if students use the metacognitive process that is if they realize, monitor, and control their own learning. In general, it is evident that good students are metacognitive skilled and on the other hand metacognitive poor people are imperfect in the way they

handle learning tasks in most subjects (Conner, 2007 as cited in Baird, 1986, 1992, 1998; Shuell, 1988; Wang & Peverly, 1986).

In brief, this study examined the relationship of metacognition awareness on the academic achievements of student teachers, who will later become teachers. Academic achievement refers to knowledge, skills, and scientific attitudes mastered by students after going through a unit of education time in college. The smallest unit of education in college is called as semester. In one semester, students can learn several subjects so that academic achievement includes the results of learning all the subjects. Student academic achievement in one semester is expressed in the form of an achievement index (IP), and in the form of the average value of all courses studied by students in one semester.

Methodology

Research design, participants, and locale of the study

A quantitative method was used and the sample was taken by involving the third, fifth, and seventh semester students to describe the metacognitive awareness of Indonesian language and literature educational students in one private higher education institution, and to differentiate student metacognition by gender and length of study, and to correlate metacognition awareness on student achievement indexes. Variable metacognition and student achievement indexes were collected without giving treatment and data were collected at the time of the study.

The research sample was taken using nonprobability sampling. Samples were taken by involving semester III, V, and VII student teachers; while the first semester students were not involved because they were learning at the time so their learning achievements cannot be recorded. The number of samples completing the data was 42 respondents, consisting of 25 women and 17 men with the ages ranging from 20 years to 26 years.

Data collection and analysis

Data collection was carried out by using documents in the forms of student achievement index data and questionnaires. The documents were used to collect student achievement index data administered in Academic and Student Administration Section at the research site. The questionnaire was used to collect student metacognition awareness data. There were 52 question items in the questionnaire modified from the MAI (metacognitive awareness inventory) questionnaire developed by Schraw and Dennison (1994) with a reliability value of Cronbach's alpha 1.0096 (greater than 0.6). The items in the questionnaire statement consisted of 19 items of metacognition knowledge (6 items of procedural knowledge, 8 declarative knowledge, and 5 conditional knowledge) and 33 items of regulatory metacognition (10 items of information management strategy, 7 items of monitoring, 6 items of evaluations, 5 items of planning, and 5 items of debugging strategies). The questionnaire was in the form of a Likert scale, where each item was followed by 4

answer choices; Strongly Disagree (SD), Disagree (D), Agree (A), or Strongly Agree (SA). Each answer choice was given a score in sequence 1, 2, 3, and 4. The choice of this answer did not use a midpoint to avoid a neutral answer.

Data analysis was performed using manual calculations and SPSS 16.0 for Windows. To test the differences in metacognition awareness of male students and female students, the Mann Whitney Large Sample Rank Test formula was used because the sample was more than 20 respondents (Siregar, 2015). Meanwhile, the Spearman Rho correlation formula was used to examine the relationship between student metacognition awareness and student achievement indexes.

Ethical considerations

This study used individuals as the main source of the information. To contend with the ethics, although in Indonesia there is no administrative body established to protect the rights and welfare of human research subjects recruited to participate in this research, I covered the identities of people, places, and the research location by way of made-up names to keep the rights of human research participants. Additionally, participation in this study was totally volunteer.

Findings

Student metacognition awareness

Based on the data analysis, it was found that the scores of metacognition awareness obtained by students ranged from 117 to 184, with the same average and median score of 157 or 76% and standard deviation of 14.53. After this score was converted into a scale of 0-100 to be categorized as Green rating scale (Suratno, 2011), it turns out that most students (33 people or 79%) were in 'Good' category (score 68-84), (51-67), the remaining 5 people or 12% included in 'Very Good' category (85-100) and 4 respondents (10%) included the developing category. Thus, it can be stated that student metacognition awareness was included in 'Good' category.

Table 1. *Category of student metacognition awareness*

Category	Range of Score (%)	Frequency	%
Very good	85-100	5	12
Good	64-84	33	78
Developing	51-63	4	10

Furthermore, this also describes student metacognition awareness based on components presented in Table 2.

Table 2. *Components of student metacognition awareness*

No	Components of Metacognition	Total of items	Average score	%
1	Cognition Knowledge	19	55.95	74
	Declarative knowledge	8	23.95	75
	Procedural knowledge	6	17.59	73
	Conditional knowledge	5	14.41	72
2	Cognition Regulation	33	100.14	76
	Planning	5	15.83	79
	Information management Strategy	10	28.88	72
	Monitoring of understanding	7	21.12	75
	Debugging strategy	5	16.24	81
	Evaluation	6	18.07	75

According to Table 2, it was known that the components of student cognition regulation measured through 33 items of statements turned out to have a greater average (100.14 or 75%) than students' cognition knowledge with an average of 55.95 or 73% measured through 19 statements. Furthermore, based on the details of the two types of metacognition translated into eight aspects categorized as Schraw and Dennison (1994), the highest aspect was debugging strategy with an average score of 16.24 or 81%. Next, the mean sequentially covered planning aspect of 15.83 (79%), monitoring aspect of 21.12 (75%), evaluation aspect of 18.07 (75%), declarative knowledge aspect of 23.95 (75), procedural knowledge aspect of 17.59 (73%), information management strategies aspect of 28.88 (72%), and knowledge aspect of 14.41 (72%). Thus, it meant that the lowest score of metacognition awareness was from the knowledge aspect.

Differences in metacognition based on gender and length of study

Differences in metacognition between female and male students were analyzed by using nonparametric comparative analysis with a large Mann Whitney rating test formula (Siregar, 2015) because the sample was more than 20 (twenty) respondents. From these calculations, Z was calculated $-.128$. On the other hand, Z table at the real level (significance) of 5% with the two-party test was $1 - .05 / 2 = 1 - .025 = .975$, and the value of .975 in the Normal Distribution Table is 1.96. So, Z count was in the acceptance region of null hypothesis, $-1.96 < -.128 < 1.96$, so it was noticed that there was no significant difference between metacognitive awareness of male and female students. Calculations using SPSS 16.0 for Windows were obtained by Asymp. Sig. (2-tailed) of .898, because of the value of Asymp. Sig. $.898 > .05$ it can be concluded that the null hypothesis was accepted. There was no significant difference between metacognitive awareness of male and female students.

Table 3. *SPSS test results using the Mann Whitney U Formula*

	Metacognition Awareness
Mann-Whitney U	207.500
Wilcoxon W	360.500
Z	-.128
Asymp. Sig. (2-tailed)	.898

As with sex differences, the differences in the length of the study did not show statistical differences. By using the Kruskal-Wallis Ranking Test (H Test), the value of H count = .11083. This value turned out to be smaller than the X^2 table 5.991 in the Chi Square Table. This meant that the null hypothesis was accepted that there was no significant difference (significant) metacognitive awareness between students in semester III, V, and VII. Based on the Kruskal-Wallis test, the value of the average metacognition awareness was obtained every semester as listed in Table 4. Sequential metacognitive awareness of semester III, V, and VII students was 20.82, 21.20, and 22.15. Briefly, there was a very small difference between 0.38 and 0.95.

Tabel 4. *Mean rank*

	Semester	N	Mean Rank
Metacognition Awareness	third semester	17	20.82
	fifth semester	5	21.20
	seventh semester	20	22.15
	Total	42	

The long difference in this study was not significant based on testing using SPSS 16.0 for Windows which resulted in the value of P Value as indicated by the value of Asymp. Sig. amounting to .946. This value was greater than the critical limit .05 which meant the null hypothesis was accepted; there was no significant difference between metacognitive awareness of students in the third semester, the fifth semester, and the seventh semester. The calculation results were listed in Table 5.

Tabel 5. *Testing score of Kruskal Wallis*

	Metacognition Awareness
Chi-Square	.111
Df	2
Asymp. Sig.	.946

- a. Kruskal Wallis Test
- b. Grouping Variable: Semester

Correlation of metacognition awareness with learning achievement

Based on data analysis, student achievement index ranged from 2.99 to 4.00, with an average of 3.46 and standard deviation .27. Categorization rating scale was used from Green (2011) by converting data into a scale of 0-100. Student academic achievement index can be categorized as 'Very Good' because 59.05% of students were in 'Very Good' category and the rest (40.5%) was in 'Good' category.

Furthermore, the correlation between metacognition awareness and student achievement index was calculated by using SPSS and obtained the correlation coefficient number .193. The sig (2-tail) value was 0.220 greater than the criticism value of 0.05. To conclude, the correlation was not significant. Although it was not significant, there was a very weak direct correlation between metacognitive awareness and student achievement index of student teachers.

Discussion

The first result of this study stated that there was no significant difference between metacognitive awareness of male and female student teachers. This finding confirmed the research findings of Mesároã, Mesároãová, and Mesároãová's (2012) study that also found that there were no gender differences in the metacognition awareness of university students in Slovakia. This study also used a modified MAI questionnaire in Slovak (Schraw & Denisson, 1994). The second result stated that there was no significant difference between metacognitive awareness of the third semester, fifth semester, and seventh semester students. This result was different from the theory put forward by Flavell (1976) and his colleagues (Fisher, 1998) reported that metacognition awareness develops with age, and older students are more successful or higher in metacognitive awareness because they have internalized a large amount of metacognitive information. However, Fisher (1998) added that the failure to use metacognition awareness is not too age-related, but rather has to do with experience. When older students (in this case students of the fifth and seventh semester) did not show better metacognition awareness than their younger counterparts (third semester students), it can be noted that the students' experience in using metacognitive awareness was lacking.

In this regard, educator intervention is needed to provide experience for students with using metacognition awareness. The frequency of experience given will develop the components of metacognition awareness; it can increase the success of students in completing their learning tasks and life tasks. Fisher (1998) stated that what students need is not only explicit teaching but also metacognition assistance. The help of metacognition can be carried out in various ways, and one of the ways suggested by Fisher (1998) is the experience of mediated self-reflection. This mediated learning is also called scaffolding learning. Therefore, educators should carry out learning by involving scaffolding techniques so that students can gradually manage their own learning and thinking. Scaffolding is

provided by lecturers or people who are more capable of guiding students or people who are learning past the zone of proximal development (Hammond & Gibbons, 2001). Scaffolding helps students to work with increasing independence, students not only know what is done and thought, but also how to think, do, and apply it in a new context.

Moreover, there are three main characteristics of scaffolding actions named contingency, fading, and transfer of responsibility (van de Pol, Volman, & Beishuizen, 2010). Contingency is the provision of assistance or support in accordance with the needs of students, and must be a little higher than the ability of current students. For this reason, a diagnostic strategy is needed to find out the strengths and weaknesses of students so that they can provide the needed assistance. After knowing the existence of student metacognitive abilities, the lecturers are expected to teach contingency so that students succeed in understanding their metacognition. When students begin to understand, recognize themselves, plan, monitor, and evaluate, then gradually assistance and support reduced from time to time, this is called scaffolding. When support is reduced, lecturers can transfer responsibility to students so that students will take higher control over their learning activities (Young, 2018).

In short, scaffolding learning can be given by using one or a combination of the following scaffolding techniques: oral scaffolding, writing scaffolding, and action scaffolding (Eriyani, 2016). Oral scaffolding is given through verbal interactions with students, such as giving explanations, lectures, and discussions. Writing scaffolding is given through written communication, such as lecturer notes on student worksheets, and handouts. Action scaffolding action is given through certain actions in the form of direct involvement of the lecturer in the activities of solving or completing student assignments to transfer their work methods (in planning, monitoring, and evaluating) to students.

Conclusion and Recommendations

This study aimed to describe the metacognition awareness of Indonesian language and literature education students in one private higher education institution, Jambi Indonesia, and to distinguish student metacognition based on gender and length of study, and correlate metacognition awareness with student achievement indexes. The results of the study reported, first, the metacognitive awareness of student teachers can be categorized as 'Good' level with an average score of 76%. Second, there was no significant difference between metacognitive awareness of male and female students, because Z count was in the acceptance area of the null hypothesis, $-1.96 < -.128 < 1.96$. Third, there was no significant difference between metacognition awareness of the third, fifth and seventh semester students. The last findings were quite surprising, it turned out that there was a very weak positive relationship between metacognition awareness and student learning achievement.

Finally, the third finding alarmed to be aware that the length of learning had not yet affected student metacognition awareness. Therefore, an intervention effort is needed that allows older education students to have higher education as well as their metacognition awareness so that when they pass their study, their metacognition awareness has developed

maximally. This will enable them to become educators who can compete anywhere. For this reason, it is recommended that educators apply learning that accelerates the mastery of student metacognition awareness so that they can face and resolve learning problems and tasks they face.

Disclosure statement

No potential conflict of interest was reported by the author.

Acknowledgments

I would like to thank IRJE and reviewers for accepting my article.

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Biographical notes

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